

# Landscape Principles for Wetlands in a Depressional or Slope Setting

## Alteration of Water Processes at the Landscape Scale

Do water processes have a low degree of alteration in the surrounding watershed? To determine the degree of alteration of water flow processes for the project watershed, check all that apply:

- ☐ The contributing basin has more than 10% impermeable surface.
- ☐ Less than 65% of the watershed is in forested cover.
- ☐ The predominate land use or land cover is commercial agriculture (tilling).
- ☐ A network of ditches and/or roads across the landscape regularly intercepts and re-routes surface and subsurface flows.

If you selected only one, or none, of the above conditions, then the water flow processes probably have a low degree of alteration. You can click [Yes](#), and go on to Alteration of Water Processes at the Site Scale.

If you selected more than one of the above conditions, then the water flow processes have probably been significantly altered. These conditions will affect functions of the design wetland and will need to be taken into consideration. This can include water level fluctuation and high inputs of sediment, nutrients, and toxics.

Wetland location and design, however, can assist in restoring landscape scale processes and correcting regional problems resulting from these alterations.

What landscape scale problems does the design wetland address?

Problem	Yes	No	Not Applicable
Regional flooding?			
Water quality?			
Decreased recharge?			
Downstream erosion?			
Loss of habitat connectivity?			
Loss of historic habitat?			

If your wetland does not address an existing landscape scale problem, then a redesign should be considered.

## **Alteration of Water Processes at the Site Scale**

Are any of the following site scale alterations present (on or adjacent to the site)?

- Road cuts
- Wetland fill (includes roads and berms)
- Drain tile
- Ditches
- Culverts
- Subsurface obstructions (utility lines and associated fill)

If present then answer the following set of questions.

- If alterations (listed above) have blocked or altered flows (especially return flows), can they be removed or redesigned to restore natural flows? (plug ditches, remove fill, enlarge or remove culverts as necessary) ☐ yes ☐ no ☐ NA
- If you can not restore the applicable site processes, you should consider another site where the processes are not altered, or where they can be restored.

## **Hydrologic Principles for Site Design**

Based on its location, does your design wetland incorporate one of the principle sources of hydrology listed below:

- ☐ Is the primary source of water from return flow, including groundwater discharge or precipitation?

If the above situation does not apply, it is an indicator that the proper hydrology does not exist and you should enter a "no" in the tally. no

- Is the wetland design consistent with the type of wetlands naturally occurring in this hydrogeologic setting? ☐ yes ☐ no (it is Atypical)
- Are hydric soils present? ☐ yes ☐ no
- Does the design avoid excavation of hydric soils? ☐ yes ☐ no
- The major source of water to the designed wetland is not based on engineered delivery.  
☐ yes ☐ no

- Does the design avoid excavation that can breach relatively impermeable layers just below the surface? ☐ yes ☐ no

If any of the following alterations are present, are they being addressed?

Alterations	Yes	No	Not Applicable
Wetland fill - remove/restore natural water flow			
Drain tile - break			
Ditches - fill/plug			
Culverts - remove/redesign			
Subsurface obstructions - restore natural flows			
Road cuts - restore natural flows			

- If the contributing basin has an altered water regime, does the design allow water level fluctuation to mimic levels that would be "natural"? ☐ yes ☐ no

## Conclusions for Site Selection and Design

Briefly summarize the results from above questions. If you have significantly more "No"s than "Yes"s, or you have checked one of the , then you have a non-sustainable design. You are encouraged to consider the following alternatives before proceeding:

- An alternative design
- Another site where processes can be more fully restored and the design is consistent with the HGM setting

If the decision is to proceed with the proposed design, the project will probably have to rely on a non-sustainable, engineered design to ensure the existence of a wetland.

# Principles for Site Construction, Monitoring, and Maintenance

## Principles for Site Construction

- Does the design avoid major alteration to landforms and does it incorporate existing topographic features? ☐ yes ☐ no
- Does the design allow one year to observe hydrology and adjust the planting scheme or hydrology prior to any wetland plantings? ☐ yes ☐ no
- Does the design incorporate low gradient slopes throughout? ☐ yes ☐ no
- Does the design call for using equipment that will not compact the soil? ☐ yes ☐ no
- Does the design call for appropriate soil amendments and/or mulching? ☐ yes ☐ no
- Does the design have adequate buffers to protect the functions being proposed?  
☐ yes ☐ no

## Principles for Site Monitoring

- Does the design call for monitoring for at least 10 years? ☐ yes ☐ no
- Does the monitoring include an assessment of wetland function? ☐ yes ☐ no
- Does the monitoring plan emphasize establishing a proper water regime? ☐ yes ☐ no
- Does the monitoring plan contain adequate contingency measures, including consideration of alternative sites? ☐ yes ☐ no
- Will funds be readily available to implement any contingency measures identified?  
☐ yes ☐ no

## Principles for Site Maintenance for a Sustainable Design

If the design includes plantings, will there be irrigation until plants are established?  
☐ yes ☐ no

Does the design include an adequate maintenance plan?

Maintenance Plan	Yes	No	Not Applicable
Regular maintenance			
Trained crew (familiar with wetland plants)			
Control of invasives, weeds, replace plantings			
Maintenance of irrigation system or water control structures			

Does the plan include funds for implementing the maintenance plan to ensure establishment of the wetland? yes no

### Principles for Site Maintenance for an Un-Sustainable/Atypical Design

- Does the design include an agreement and monetary commitment for the maintenance of the wetland in perpetuity? ☐ yes ☐ no
- If the design includes plantings, will there be irrigation until plants are established? ☐ yes ☐ no
- Does the design include a long term maintenance plan?

Maintenance Plan	Yes	No	Not Applicable
Regular maintenance			
Trained crew (familiar with wetland plants)			
Control of invasives, weeds, replace plantings			
Maintenance of irrigation system or water control structures			

## Conclusions

Review your responses to the questionnaire about the proposed design, and consider the following:

- If you answered "No" to a question with , then you may have a non-sustainable design.
- "Yes" answers indicate compliance with accepted ecological principles.
- "No" answers indicate that the design does not conform to accepted ecological principles.
- If you have significantly more "Yes"s than "No"s, you probably have a sustainable design.

If you have significantly more "No"s than "Yes"s, then you probably have a non-sustainable design. The best response to this is to consider:

- An alternative design
- Another site where processes can be more fully restored and the design is consistent with the HGM setting

If the decision is to proceed with the non-sustainable design, the project will probably have to rely on a high degree of maintenance, contingency measures (replanting), and possible redesign and reconstruction in the future to ensure the continued existence of a wetland. During permit review, changes may be required in order to achieve a sustainable design.